

WHAT IS CLAIMED IS:

1. A semiconductor device comprising a voltage conversion circuit for converting a voltage value of an input voltage according to temperature change and outputting an output voltage, wherein
said voltage conversion circuit includes:
 - 5 an input section having a first transistor connected between a first voltage line and a first node, and carrying an input current by applying said input voltage to said first transistor;
 - a current-mirror section having a second transistor connected between said first node and a second voltage line supplying a different
10 voltage from a voltage supplied by said first voltage line, and a third transistor connected between a second node, to which an output current according to said input current is carried, and said second voltage line, and forming a current-mirror by said second and third transistors;
 - an output section having a fourth transistor connected between said
15 second node and said first voltage line, and outputting said output voltage according to said output current from said second node; and
 - a resistance section connected only one of between said second voltage line and said second transistor and between said first voltage line and said fourth transistor, and provided only as a resistance element in
20 said voltage conversion circuit.
2. The semiconductor device according to claim 1, further comprising a plurality of said voltage conversion circuits, wherein
said plurality of voltage conversion circuits is cascaded to each other to form voltage conversion circuit stages.
3. The semiconductor device according to claim 2, wherein
in said voltage conversion circuit stages, said resistance sections of at least said two voltage conversion circuits are made of resistance materials different in temperature characteristic.

4. The semiconductor device according to claim 2, wherein
said resistance sections of a same resistance material in the voltage
conversion circuits have patterns of an equal pattern width and lengths
according to resistance values of the resistance sections.

5 5. The semiconductor device according to claim 2, comprising an
output voltage generation circuit for selecting one of the output voltages of
said voltage conversion circuit stages except for a final voltage conversion
circuit stage, and capable of outputting a voltage corresponding to the
selected output voltage.

6. The semiconductor device according to claim 2, comprising a
constant voltage source circuit for supplying said input voltage to an initial
voltage conversion circuit stage among said voltage conversion circuit
stages, wherein
5 said input voltage is adjusted by making gate widths of transistors
forming said constant voltage source circuit variable.

7. The semiconductor device according to claim 2, wherein
transistors forming equal parts of the voltage conversion circuits
among said voltage conversion circuit stages are respectively formed by one
of connecting a single pattern of transistors equal in gate length and gate
width and connecting a plurality of patterns of transistors equal in gate
5 length and gate width in parallel.

8. The semiconductor device according to claim 2, wherein
said resistance section of one of said voltage conversion circuit stages
includes a variable resistance.

9. The semiconductor device according to claim 8, wherein
only the resistance section of an initial voltage conversion circuit
stage among said voltage conversion circuit stages includes the variable
resistance.

10. The semiconductor device according to claim 2, comprising a constant voltage source circuit having another resistance section, and supplying said input voltage to an initial voltage conversion circuit stage among said voltage conversion circuit stages, wherein

5 resistance materials of the voltage conversion circuit stages at least except for the initial voltage conversion circuit stage are equal to a resistance material of the resistance section of said constant voltage source circuit.

11. A semiconductor device comprising a plurality of voltage conversion circuits each outputting an output voltage according to an input voltage, wherein

each of said voltage conversion circuits includes:

5 an input section connected to a first voltage line, receiving said input voltage, and carrying an input current;

a current-mirror section connected to a second voltage line supplying a different voltage from a voltage supplied by said first voltage line, and supplying an output current according to said input current;

10 an output section connected to said first voltage line, and outputting said output voltage according to said output current; and

a resistance section connected one of between said current-mirror section and said second voltage line and between said output section and said first voltage line,

15 said plurality of voltage conversion circuits are cascaded to each other to form a plurality of voltage conversion circuit stages, and circuits elements forming said voltage conversion circuits are equal in connection relationship among the stages and said output voltage of each voltage conversion circuit stage rise or fall according to temperature rise.

12. The semiconductor device according to claim 11, wherein

in said voltage conversion circuit stages, said resistance sections of at least said two voltage conversion circuits are made of resistance materials different in temperature characteristic.

13. The semiconductor device according to claim 11, wherein said resistance sections of a same resistance material in the voltage conversion circuits have patterns of an equal pattern width and lengths according to resistance values of the resistance sections.

14. The semiconductor device according to claim 11, comprising an output voltage generation circuit for selecting one of the output voltages of said voltage conversion circuit stages except for a final voltage conversion circuit stage, and capable of outputting a voltage corresponding to the
5 selected output voltage.

15. The semiconductor device according to claim 11, comprising a constant voltage source circuit for supplying said input voltage to an initial voltage conversion circuit stage among said voltage conversion circuit stages, wherein
5 said input voltage is adjusted by making gate widths of transistors forming said constant voltage source circuit variable.

16. The semiconductor device according to claim 11, wherein transistors forming equal parts of the voltage conversion circuits among said voltage conversion circuit stages are respectively formed by one of connecting a single pattern of transistors equal in gate length and gate
5 width and connecting a plurality of patterns of transistors equal in gate length and gate width in parallel.

17. The semiconductor device according to claim 11, wherein said resistance section of one of said voltage conversion circuit stages includes a variable resistance.

18. The semiconductor device according to claim 17, wherein only the resistance section of an initial voltage conversion circuit stage among said voltage conversion circuit stages includes the variable resistance.

19. The semiconductor device according to claim 11, comprising a constant voltage source circuit having another resistance section, and supplying said input voltage to an initial voltage conversion circuit stage among said voltage conversion circuit stages, wherein

5 resistance materials of the voltage conversion circuit stages at least except for the initial voltage conversion circuit stage are equal to a resistance material of the resistance section of said constant voltage source circuit.

20. The semiconductor device according to claim 11, wherein said resistance section included in each of said voltage conversion circuits is provided on only one part, and

5 said resistance section and other resistance sections are not included in other parts of each of said voltage conversion circuits.